Declaration

I hereby declare that the work presented in this thesis titled *"Dopamine induces functional extracellular traps in microglia"* submitted to the Indian Institute of Technology Jodhpur in partial fulfilment of the requirements for the award of the degree of Doctor of Philosophy, is a bonafide record of the research work carried out under the supervision of *Dr. Sushmita Jha*. The contents of this thesis in full or in parts, have not been submitted to, and will not be submitted by me to any other Institute or University in India or abroad for the award of any degree or diploma.

Ishan Agrawal
P15BL001

Certificate

This is to certify that the thesis titled *"Dopamine induces functional extracellular traps in microglia"*, submitted by *Ishan Agrawal (P15BL001)* to the Indian Institute of Technology Jodhpur for the award of the degree of Doctor of Philosophy, is a bonafide record of the research work done by him under my supervision. To the best of my knowledge, the contents of this report, in full or in parts, have not been submitted to any other Institute or University in India or abroad for the award of any degree or diploma.

Dr. Sushmita Jha
Ph.D. Thesis Supervisor

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Ishan Agrawal
Ph.D. Student

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List of Symbols

Symbol	Description
α	Alpha
β	Beta
γ	Gamma
g	Gram
µ	Micro
°	Degree
%	Percentage
C	Celsius
h	Hour
l	Litre
ml	Milli
m	Meter
M	Molar
pH	Hydrogen Ion Concentration

List of Abbreviations

Abbreviation	*Full form*
MPTP	1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine
ABAH	4-aminobenzoic acid hydrazide
Akt	Serine/threonine kinase 1
AD	Alzheimer's disease
Aβ	Amyloid β
ALS	Amyotrophic lateral sclerosis
ACPAs	Anti-citrullinated protein antibodies
ANCA	Anti-neutrophil cytoplasmic autoantibody
AAV	Anti-neutrophil cytoplasmic autoantibody associated vasculitis
APOE	Apolipoprotein E
ATG5	Autophagy related 5
BETs	Basophils extracellular traps
BMDMs	Bone marrow derived macrophages
C. albicans	*Candia albicans*
CAI	Calcium ionophores
CCL2	C-C motif chemokine ligand 2
CCL3	C-C motif chemokine ligand 3
CNS	Central nervous system
CGD	Chronic granulomatous disease
CML	Chronic myelogenous leukemia
CRSwNP	Chronic rhinosinusitis with nasal polyps
c-Raf	RAF proto-oncogene, serine/threonine-protein kinase
CX3CR1	C-X3-C motif chemokine receptor 1
CXCL1	C-X-C motif chemokine ligand 1
CXCL12/SDF-1	C-X-C motif chemokine ligand 12
CXCR4	C-X-C chemokine receptor type 4
cAMP	Cyclic AMP
DAMPs	Damage-associated molecular patterns
DPI	Diphenyleneiodonium
DA	Dopamine
DR2	Dopamine receptor 2
DRs	Dopamine receptors
DRP-1	Dynamin-1-like protein
E. Coli	*Escherichia coli*
ECP	Eosinophil cationic protein
EETs	Eosinophil extracellular traps
ERK/MAPK1	Mitogen-activated protein kinase 1
ETs	Extracellular traps
fMLP	Formyl-Met-Leu-Phe
FUS	Fused in sarcoma
G-CSF	Granulocyte colony-stimulating factor
GDNF	Glial cell–derived neurotrophic factor
GBM	Glioblastoma multiforme
GAMs	Glioma associated macrophages
GM-CSF	Granulocyte monocyte colony stimulating factor
HIV	Human immunodeficiency virus
HMGB1	High mobility group box 1
HIF-1α	Hypoxia-inducible factor-1α
Iba1	Ionized calcium binding adapter molecule 1
ICAM-1	Intercellular adhesion molecule 1
IDH1	Isocitrate dehydrogenase 1
IL	Interleukin
iIC	Immobilized immune complexes
IFN-γ	Interferon-γ
L. amazonensis	*Leishmania amazonensis*
GWAS	Large-scale genome-wide association studies

LC3B	Microtubule associated protein 1 light chain 3 beta
LRRK2	Leucine-rich repeat kinase 2
LPS	Lipopolysaccharide
LTA	Lipoteichoic acid
LDGs	Low-density granulocytes
MIP1α	Macrophage inflammatory protein 1α
MBP	Major basic protein
MHC	Major histocompatibility complex
mTOR	Mammalian target of rapamycin
MCETs	Mast cell extracellular traps
M-CSF	Macrophage colony-stimulating factor
MEK	Mitogen-activated protein kinase kinase 1
MFN-2	Mitofusin 2
MLKL	Mixed lineage kinase domain–like
MCP-1	Monocyte chemoattractant protein-1
MSU	Monosodium urate crystals
MPO	Myeloperoxidase
MOI	Multiplicity of infection
MPO	Myeloperoxidase
NOX	NADPH oxidase
NE	Neutrophil elastase
Nf1	Neurofibromatosis type 1
NETs	Neutrophils extracellular traps
NLRP3	NLR family pyrin domain containing 3
NRF-1	Nuclear respiratory factor 1
oxLDL	Oxidized low density lipoprotein
P. aeruginosa	Pseudomonas aeruginosa
PD	Parkinson's disease
PGC1α	Peroxisome proliferator-activated receptor gamma coactivator 1-alpha
PI3K	Phosphoinositide 3-kinases
PINK1	Pten induced kinase 1
PKC	Protein kinase C
pDCs	Plasmacytoid dendritic cells
PAF	Platelet-activating factor
PMA	Phorbol 12-myristate 13-acetate
PMN	Polymorphonuclear leucocytes
PAD4	Protein arginine deiminase
PR3	Proteinase 3
RAGE	Receptor for advanced glycation end-products
RIPK1	Receptor-interacting protein kinase-1
RA	Rheumatoid arthritis
ROS	Reactive oxygen species
S. aureus	*Staphylococcus aureus*
Src	Src proto-oncogene, non-receptor tyrosine kinase
STING	Stimulator of interferon genes
SDF-1	Stroma-derived factor-1
SOD1	Superoxide dismutase1
Syk	Spleen associated tyrosine kinase
SLE	Systemic lupus erythematosus
TDP-43	TAR-DNA binding protein 43
TFAM	Transcription factor a, mitochondrial
TGF-β	Transforming growth factor beta
Th 17	T helper 17
TSLP	Thymic stromal lymphopoietin
TLR	Toll-like receptors
TNF	Tumor necrosis factor
TREM2	Triggering receptor expressed on myeloid cells 2
TH	Tyrosine hydroxylase
VCAM-1	Vascular cell adhesion molecule 1